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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/036,787	10/19/2001	Takayuki Toshima	199372003600	5431
25224 7590 12/23/2003 MORRISON & FOERSTER, LLP 555 WEST FIFTH STREET SUITE 3500 LOS ANGELES, CA 90013-1024			EXAMINER CULBERT, ROBERTS P	
			ART UNIT	PAPER NUMBER
			1763	

DATE MAILED: 12/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<p align="center">Office Action Summary</p>	Application No. 10/036,787	Applicant(s) TOSHIMA ET AL.	
	Examiner Roberts Culbert	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 October 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,3,6,7,17-19 and 21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2,3,6,7,17-19 and 21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
- 1. ☒ Certified copies of the priority documents have been received.
 - 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet, 37 CFR 1.78.
 a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet, 37 CFR 1.78.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/31/03 has been entered.

Response to Arguments

Applicant's arguments filed 07/31/03 have been fully considered but they are not persuasive as discussed in detail below.

Applicant has argued that Konuma ozone concentration is irrelevant because the ozone water is applied before etching whereas the applicant has applied the ozone water after the etching step. The argument is not persuasive because Konuma is only cited by the examiner to demonstrate that it is known in the art to use the concentration of 0.1 to 20 ppm ozone water to form a thin oxide on a silicon substrate to increase the wetting as stated by Konuma (Col. 2, Lines 16-22). Konuma is not cited to show other method steps. The admitted prior art teaches that it is conventional in the art to apply the ozone water after etching in order to form a hydrophilic oxidation film. Konuma simply teaches the concentration needed to produce a hydrophilic surface.

Applicant has argued that Kamikawa fails to disclose the hydrophilic process recited in claims 17 and 21. The argument is not persuasive because both Konuma and the admitted prior art disclose the claimed feature as discussed in the rejections below. Kamikawa is merely cited to show the art-recognized equivalence of solvent drying, spin drying, and drying by spraying a dry gas.

One cannot show non-obviousness by attacking references individually where the rejections are based on a combination of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981), *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 17-19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art.

The admitted prior art discloses known methods for processing a substrate wafer with a resist pattern and an oxidation film. The known process steps include etching the oxidation film with a chemical liquid (Page 1, Lines 22-25), washing and drying (Page 1, Line 25). Further, it is known to rinse the wafer with ozone water after the etching step to produce a hydrophilic surface and prevent watermarks (Page 1, Lines 30-33). Applicant also teaches that it is old in the art that the wafer may have a patterned resist formed and developed on the wafer, and later removed (Page 1, Col 15-20).

The admitted prior art further teaches that it is known that the resist is dissolved by the ozone-water if the concentration is relatively high (Page 2, Lines 10-15). Therefore the concentrations of ozone water that will dissolve a resist and the problem of resist deterioration must be well known in the art. It would therefore have been obvious to one of ordinary skill in the art at the time of invention to use a

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concentration that is low enough to avoid the art-recognized problem of dissolving the resist, resulting in deterioration of quality and yield rate, yet high enough to produce a hydrophilic surface. Using the known guidelines for concentration would clearly result in a concentration within the claimed range as the physical limitations of producing a hydrophilic surface without dissolving the resist are the same in both the process of the admitted prior art and the claimed invention. It may be assumed that the thickness of the oxidation film would be 6-10Å, since the concentration of the ozone water is the same, and the oxide layer is formed naturally by contact between the ozone water and the substrate surface.

Regarding claims 18, and 19, the step of forming ozone water by continuously adding ozone water to a rinsing liquid does not define over the prior art. Official Notice is taken of the fact that it is old and well known in the art of general chemistry to adjust the concentration of a solution by changing either the amount of solute or the amount of solvent. It would have been obvious to one of ordinary skill in the art at the time of invention to mix ozone water with rinsing liquid to form a solution of a desired concentration as indicated by Konuma. One of ordinary skill in the art would be motivated to mix the ozone water and rinsing liquid by connecting the ozone water line and the rinsing liquid line in order to remove the additional step of pre-mixing a known concentration ozone liquid. Additionally, one of ordinary skill in the art would be motivated to connect the two liquid lines in order to allow the concentration of the ozone water to be adjusted.

Regarding claim 21, the admitted prior art does not teach that the method for the substrate with a resist pattern may be carried out in the same chamber as the method for the substrate with no resist pattern. However, it would have been obvious to one of ordinary skill in the art at the time of invention to perform both methods in the same chamber since the process steps needed in both methods overlap. Both methods require the same etching, rinsing, and drying steps. One of ordinary skill in the art would have been motivated to combine the methods in the same processing chamber in order to reduce the materials of construction and associated processing costs.

Claims 17-19, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art in view of U.S. Patent 6,127,279 to Konuma.

The admitted prior art discloses known methods for processing a substrate wafer with a resist pattern and an oxidation film. The known process steps include etching the oxidation film with a chemical liquid (Page 1, Lines 22-25), washing and drying (Page 1, Line 25). Further, it is known to rinse the wafer with ozone water after the etching step to produce a hydrophilic surface and prevent watermarks (Page 1, Lines 30-33). Applicant also teaches that it is old in the art that the wafer may have a patterned resist formed and developed on the wafer, and later removed (Page 1, Col 15-20).

The admitted prior art does not teach ozone water concentration in the range 0.5-10ppm. Konuma teaches that a hydrophilic (increased wetting) surface may be obtained on a resist-patterned substrate by using ozone water in the range 0.1 to 20ppm (Col. 5 Lines 30-33). It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the range specified by Konuma during the ozone water rinsing step of the claimed invention in order to produce a hydrophilic surface as Konuma teaches that the concentration range produces a hydrophilic surface on a wafer, and the admitted prior art teaches that it is desirable to form a hydrophilic surface to prevent watermarks on the wafer. It may be assumed that the thickness of the oxidation film would be 6-10Å, since the concentration of the ozone water is the same, and the oxide layer is formed naturally by contact between the ozone water and the substrate surface.

Regarding claims 18, and 19, the step of forming ozone water by continuously adding ozone water to a rinsing liquid does not define over the prior art. Official Notice is taken of the fact that it is old and well known in the art of general chemistry to adjust the concentration of a solution by changing either the amount of solute or the amount of solvent. It would have been obvious to one of ordinary skill in the art at the time of invention to mix ozone water with rinsing liquid to form a solution of a desired concentration as both Konuma and the admitted prior art teach that the concentration should be controlled within a range. One of ordinary skill in the art would be motivated to mix the ozone water and rinsing liquid by connecting the ozone water line and the rinsing liquid line in order to remove the additional step of pre-mixing a known concentration ozone liquid. Additionally, one of ordinary skill in the art would be motivated to connect the two liquid lines in order to allow the concentration of the ozone water to be adjusted.

Regarding claim 21, the admitted prior art does not teach that the method for the substrate with a resist pattern may be carried out in the same chamber as the method for the substrate with no resist pattern. However, it would have been obvious to one of ordinary skill in the art at the time of invention to perform both methods in the same chamber since the process steps needed in both methods overlap. Both methods require the same etching, rinsing, and drying steps. One of ordinary skill in the art would have been motivated to combine the methods in the same processing chamber in order to reduce the materials of construction and associated processing costs.

Claims 2, 3, 6, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art as applied above, and in further view of U.S. Patent 6,119,367 to Kamikawa et al.

As applied above, the admitted prior art teaches the method of the invention substantially as claimed, but does not teach the use of drying with a dry gas or by rotation of the substrate (spin drying). The admitted prior art teaches only the use of solvent drying after the step of ozone water treatment. (Page 1, Lines 30-35)

However, Kamikawa et al. teaches that solvent drying, spin drying, and spraying a dry gas such as N₂ are well-known equivalent methods for drying a wafer after cleaning (Col. 1 Lines 21-32).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use any of the drying methods suggested by Kamikawa et al. for the purpose of drying the wafer in the method of the claimed invention because Kamikawa et al. teaches that solvent drying, spin drying, and spraying a dry gas such as N₂ are art-recognized equivalents for the purpose of drying a wafer, and it has been held that substitution of one art-recognized equivalent for another is *prima facie* obvious. *In re Fout*, 297, 213 USPQ 532 (CCPA 1982).

Claims 2, 3, 6, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art in view of U.S. Patent 6,127,279 to Konuma as applied above, and in further view of U.S. Patent 6,119,367 to Kamikawa et al.

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As applied above, the admitted prior art in view of Konuma teaches the method of the invention substantially as claimed, but does not teach the use of drying with a dry gas or by rotation of the substrate (spin drying). The admitted prior art teaches only the use of solvent drying after the step of ozone water treatment. (Page 1, Lines 30-35)

However, Kamikawa et al. teaches that solvent drying, spin drying, and spraying a dry gas such as N_2 are well-known equivalent methods for drying a wafer after cleaning (Col. 1 Lines 21-32).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use any of the drying methods suggested by Kamikawa et al. for the purpose of drying the wafer in the method of the claimed invention because Kamikawa et al. teaches that solvent drying, spin drying, and spraying a dry gas such as N_2 are art-recognized equivalents for the purpose of drying a wafer, and it has been held that substitution of one art-recognized equivalent for another is *prima facie* obvious. *In re Fout*, 297, 213 USPQ 532 (CCPA 1982).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (703) 305-7965. The examiner can normally be reached on Monday-Friday (7:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

R. Culbert

